

Course Title: **Stochastic Processes** العمليات العشوائية ثالثة حاسبات
Date: 29.11.2015 (First Midterm)Course Code: CCE3117 3rd year
Allowed time: 1.30 hr No. of Pages:

Answer all the following questions:

Question No. 1

(10 marks)

1. If A and B are independent events, prove that A^c and B^c are independent.
2. Let A and B be events with $P(A) = 1/2$, $P(B) = 1/3$ and $P(A \cap B) = 1/4$.
Find : i- $P(A|B)$, ii- $P(B|A)$, iii- $P(A \cup B)$, iv- $P(A^c|B^c)$, v- $P(B^c|A^c)$
3. If X be a continuous random variable with the probability
i. $P(x) = kx \quad 0 \leq x \leq 2$, and zero elsewhere
4. Find the **cummulative** distribution function, mean, variance, and standard deviation of X.
5. Given a and b are constants, find with prove i - $E(a) = ?$ ii - $\text{Var}(aX + b) = ?$
where X is a continuous random variable.

Question No. 2

(10 marks)

1. Three light bulbs are chosen at random from 20 bulbs of which 5 are defective. Find the probability that : i- exactly one is defective, ii- none is defective,
i. iii- at least one is defective iv- at most one is defective.
2. Let X be a continuous random variable with distribution :
 $f(x) = k(2-x) \quad \text{if } 0 \leq x \leq 2$ and $f(x)$ equals zero elsewhere.
Sketch the graph of $f(x)$ and thus i- Evaluate k ii- Find $P(1 \leq X \leq 2)$
3. Let X be a random variable with the binomial distribution $P(k;n,p)$.
Prove that $E(X) = np$.
4. A fair die is tossed. Let X denotes twice the number appearing, and let Y denote 1 or 2 according as an odd or an even number appears.
Find the probability, expectation, variance and standard deviation of:
i- X ii- Y

*Best wishes**Dr. Eng. Alasyed Sallam*